Tennessee
Bureau of Investigation

EVIDENCE GUIDE

Mark R. Gwyn
Director

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SPECIAL NOTICE

When submitting evidence to the TBI Laboratory, submitters acknowledge the following:

TBI examiners will choose appropriate technical processes to address the submitter's request for examination.

Depending on the caseload of the Laboratory and the needs of the submitter, evidence examinations may be subcontracted.

A TBI Laboratory Report of Examination may contain the opinions and/or interpretations of the examiner(s) who issued the report.

EVIDENCE SEALS

All evidence submitted to a Tennessee Bureau of Investigation Crime Laboratory **must** be in a container that is sealed. The only seals that will be accepted are:

- Tape
- Heat Sealed Packages
- Packages with *Tamper-Proof* Seals

All evidence seals **must** be initialed, with date and time, by the person sealing the package or placing a seal on the package.

If you are sealing the package with tape, the initials, date and time **must** overlap the tape seal and the package.

For tamper-proof packages, the initials, date and time must be **on** the seal. For heat sealed packages, the initials must be as close as possible to the seal.

Evidence that does not meet the sealing requirements cannot be accepted for analysis by a Tennessee Bureau of Investigation Crime Laboratory.

If it is not practical to package a piece of evidence (such as an entire vehicle), the officer or technician submitting that evidence should securely attach a tag to the evidence and initial the tag.

All evidence containers/packages must be sealed to the extent that nothing can be added to or removed from the container/package.

GENERAL EVIDENCE COLLECTION SUPPLIES

General Evidence Collection Supplies include, but are not limited to:

Biohazard bags and containers
Camera and accessories
Complete fingerprint kit including lift tape, cards, brushes and powder
Cotton swabs
Cotton work gloves
Coveralls
Crime scene tape
Directional compass
Drywall knife
Dust masks
Envelopes (small, large, coin, business, 9” x 12” manila)
Evidence sealing tape
Box of flares
Flashlight and extra batteries
Graph paper
Legal-size clipboard
Location markers
Magnifying glass
Measuring tape
Mylar, clear sheets (8 ½” x 10”)
Paper bags and cardboard boxes (small, medium, and large)
Pens, pencils, and permanent markers
Pocket knife (multi-tool)
Protective footwear
Protective glasses (Safety glasses)
Roll of cotton batting
Roll of string
Rubber gloves
Scissors
Small and large trash bags
Small shovel
Stapler and staples
Tape
Ziplock bags

Where to Submit Evidence and Services Offered

Submit Evidence to the Laboratory Serving Your Area:

Nashville Crime Laboratory
901 R.S. Gass Blvd.
Nashville, Tennessee 37216-2639

Philip Smith, Supervisor
(615) 744-4418

Firearms, Forensic Chemistry, Latent Prints, Microanalysis, Serology/DNA, Toxicology, Breath Alcohol

Knoxville Crime Laboratory
1791 Neals Commerce Lane
Knoxville, Tennessee 37914

Kelvin Woodby, Supervisor
(865) 549-7800

Forensic Chemistry, Breath Alcohol, Toxicology, and Serology/DNA

Memphis Crime Laboratory
6325 Haley Road
Memphis, Tennessee 38134

Kay Sherriff, Supervisor
(901) 379-3431

Firearms, Forensic Chemistry, Toxicology, Breath Alcohol, and Serology/DNA

Should you have any questions about which laboratory handles your evidence, please call any of the above laboratories for assistance ***prior*** *to submitting the evidence.*

TBI VIOLENT CRIME RESPONSE TEAM PROGRAM

Questions that will be asked prior to dispatching the TBI Violent Crime Response Team:

- Is it a homicide crime scene?
- Has the crime scene been preserved and secured?
- Has any processing already been performed?
- What processing is needed?
- What are the reasons for needing a crime scene team?
- Have you contacted the TBI Agent assigned to your county?

Each time the Violent Crime Response Team is dispatched to a crime scene, valuable laboratory time is lost. Therefore, the Violent Crime Response Team can only respond to the most violent, heinous homicide crime scenes in the state.

Recommended steps for preserving the Crime Scene

It is recommended that the following measures be taken as soon as possible:

- Tape off a generous perimeter and post officers to provide security for the scene.
- Begin a Perimeter Log requiring anyone who enters the Crime Scene to record the following information: Name, Rank, Date, Time In, and Time Out.
- Limit access to the absolute minimum people, for example:
    - Don't unnecessarily walk through the crime scene.
    - Don't smoke, eat or drink within the crime scene.
    - Don't use bathroom facilities within the crime scene.
    - Don't use the telephone within the crime scene.
    - Don't allow items to be removed from the scene.

TBI VIOLENT CRIME RESPONSE TEAM PROGRAM

Each Violent Crime Response Team consists of Forensic Specialists with expertise in Latent Prints, Firearm & Toolmark Identification, Serology/DNA and Microanalysis. This Team has access to a specially designed and outfitted vehicle containing all necessary supplies and equipment for safe and thorough crime scene processing.

Recommended steps for preserving the Crime Scene:
It is recommended that the following measures be taken as soon as possible:

A. Tape off a generous perimeter and post Officers to provide security for the scene.
B. Begin a Perimeter Log requiring anyone who enters the Crime Scene to record the following information: Name, Rank, Date, Time In and Time Out.
C. Limit access to the absolute minimum possible.

Once the decision to utilize the Violent Crime Response Team has been approved, a certain amount of time will be required for the Team to respond. (This includes notification of Team Members, travel time to the assembly point, assembling all necessary gear and equipment, and travel time to the Crime Scene.) During this time interval, should the Investigator at the Crime Scene feel that transient physical evidence is in jeopardy due to wind, rain, temperature change, etc., these conditions may require the Investigator to take steps to protect the integrity of the evidence. In this event, it is recommended that the Investigator contact the Leader of the Violent Crime Response Team who will give his or her recommendation as to the most effective way to protect the evidence until the Team arrives.

Please call the Tennessee Information Enforcement System Network Operation Center (T.I.E.S.N.O.C.) at (615) 744-4600 for assistance.

Capabilities of TBI Violent Crime Response Team

General: Documentation of the Crime Scene

A) Notes: Team will produce a detailed narrative of all activities from the time they are first contacted until they have secured the evidence in the Crime Laboratory. These notes will include such details as:

1) Weather, temperature, lighting
2) Verbal description of the scene and as many details as possible regarding it
3) Chronology and detailed account of all activities conducted by the Team
4) Results of Vehicle Inventory Searches
5) Results of Inventory Search of Victim's clothing and personal effects

B) Videotape: Team will typically produce a detailed video portrayal of:

1) The general location and exterior of the Crime Scene
2) Areas of possible entry and exit
3) Each room of the residence and its contents
4) In-depth documentation of the victim, his/her position, wounds, etc.
5) All items of evidence as they appeared when located, complete with marker number and scale
6) Full narration of video

C) Photography: Team will typically produce a detailed 35mm/digital portrayal of:

1) Location Photos – an overlapping series of photos depicting the overall scene, residence, or terrain
2) Witness Photos – Long to intermediate range photos depicting areas of possible entry and exit, all rooms from multiple angles, victim from multiple angles, photos from witnesses vantage point, photos showing spatial relationships of items of evidence to one another and to victim, etc.
3) Close-ups – Photos depicting wounds, gags, ligatures, etc.
4) Evidence Photos – Close range photos depicting each item of evidence as it appeared when located, complete with marker number and scale in the frame
5) Other – Available light, painting with light, laser photography, and other special techniques as required

D) Measuring: The dimensions of the residence and its rooms, as well as the distances between any landmarks within the scene, will typically be recorded. Each significant item within the Crime Scene will typically be measured to a minimum of two fixed, permanent reference points (if none are available, the Team will create suitable reference points). The height of any item of

evidence other than "0" will typically be recorded. Measurements will be made using one of the following methods:

1) Triangulation method
2) Rectangular coordinate method
3) Baseline rectangular coordinate method

E) Diagramming: Team can produce a detailed measured diagram of the crime scene depicting the floor plan and the spatial relationships of items of evidence to one another, to the victim, and to reference points. It will include:

1) A compass heading
2) A description of the area depicted
3) The date and time
4) The initials of the person completing the diagram
5) The initials of any measuring assistant

The diagram can be produced using one or more of the following methods:

1) Bird's Eye method – showing the floor plan from above
2) Cross Projection method – showing a fold-down or exploded view from above
3) Perspective view
4) Cut-Away view

The rough sketch may be completed to a finished diagram using one of several available computer programs.

F) Collection: Each item of evidence will be packaged in the proper type of container and will be labeled with:

1) Initials of the team member collecting it
2) Description of the item of Evidence
3) Description of where it was located
4) Date and time it was collected

In addition, an Evidence Log will be produced which records for each item of evidence collected:

1) Exhibit Number
2) Item Number
3) Marker Number
4) Location of each item
5) Description of each item
6) Date and time of collection
7) Name of the team member collecting it

Discipline Specific-Capabilities of the Latent Print Specialist

A) Locating Evidence-The Latent Print Specialist can locate evidence such as fingerprints, palm prints, footprints, or prints caused by contact with other body parts using one of the following methods:

1) Visual search for latent prints, patent (visible) prints, or plastic (impressed) prints at points of entry, exit, and any suspected areas of contact,
2) Use of Krimesite Scope to assist in the location of latent prints, or
3) Use of ALS (Alternate Light Source) to assist in the location of latent prints.

B) Enhancing Evidence-One or more of the following methods may be employed to enhance the viability of a latent print:

1) CBC (cyanoacrylate) Fuming
2) Fluorescent Dyes/ALS
3) Coomassie Blue
4) Amido Black
5) Ninhydrin
6) SPR (Small Particle Reagent)
7) Dusting with latent print powder or magnetic powder

C) Documenting Evidence-Latent Print Evidence is typically documented via:

1) Notes-A detailed record is maintained of the location of each print collected. Areas that have been processed yielding no latent prints will be recorded as well.
2) Photography-Latent Prints will often be photographed prior to lifting as a failsafe measure in case the lift is unsuccessful.
3) Lifts-Latent Prints can be lifted for collection and documentation.

D) Collecting Evidence-Items may be brought to the TBI Crime Laboratory for further processing.

The victim may be printed by the Latent Print Specialist for identification purposes.

Discipline Specific-Capabilities of the Serology/DNA Specialist

A) Locating Evidence-The Serology/DNA Specialist can locate biological evidence at the Crime Scene using one of the following methods:

1) Visual search for RBS (reddish brown stain) at the scene and on potential evidence,
2) Presumptive Chemical Tests (phenolphthalein) to determine whether an RBS is to be collected or discarded,
3) Use of ALS (Alternate Light Source) for locating possible semen stains, or
4) Use of Luminol for locating areas containing trace amounts of possible blood when it is suspected that an attempt has been made to clean up a Crime Scene. (Notify Crime Scene Team in advance if luminol is required.)

B) Documenting Evidence-The Serology/DNA Specialist can provide thorough documentation of the location of any areas which have tested:

1) Positive for Presumptive Chemical Test,
2) Negative for Presumptive Chemical Test,
3) Positive for Luminol reaction,
4) Negative for Luminol reaction,
5) Positive for ALS interaction, or
6) Negative for ALS interaction.

C) Interpretation of Bloodspatter Evidence-The Serology/DNA Specialist can provide either interpretation or proper photographic documentation of bloodspatter evidence for further analysis.

D) Collection of Evidence-The Serology/DNA Specialist can collect and properly preserve for analysis:

1) Swabs or cuttings of RBS area positive for presumptive chemical test,
2) Items of evidence with RBS positive for presumptive chemical test,
3) Items of evidence which are a possible source of semen,
4) Items of evidence which are a possible source of saliva (cigarette butts, cans, bottles, etc.), or
5) Swabs taken for standards at the scene (when appropriate).

Discipline Specific-Capabilities of the Firearm & Toolmark Identification Specialist

A) Locating Evidence-The Firearm & Toolmark Specialist can locate evidence at the Crime Scene in the following ways:

1) Checking for signs of forced entry which can produce possible identifiable toolmarks such as:

a) Impressed Toolmarks-The result of prying, striking or other direct pressure,

b) Striated Toolmarks-The result of sliding contact from tool, or

c) If toolmarks are located, they will be collected whenever practical. If it is impractical to collect the toolmark, a Cast of the toolmark will be produced and collected.

2) Sodium Rhodizonate Test-Chemical test producing a color change for lead residues such as bullet wipe,

3) Metal Detectors-The Firearm & Toolmark Specialist may select:

a) Whites Spectrum XLT when greater discrimination is required, or

b) Fisher 1270 when greater sensitivity is required.

4) Sifting Screen-When it is necessary to search dirt or mud,

5) The Firearm & Toolmark Specialist has the ability to recognize unusual ammunition components (sabots, fillers, wads, flechettes, etc.) and to identify them by their proper terminology to avoid confusion later.

B) Documenting Evidence-The Firearm & Toolmark Specialist can provide thorough documentation of:

1) The locations of items of evidence within the Crime Scene such as;

a) Firearms,

b) Ammunition Components-bullets, cartridge cases, shotshell cases, etc,

c) Live ammunition, or

d) Projectile impact points.

2) Trajectory-Determine the projectile's path when it has struck:

a) At least two fixed points of impact (3 dimensional),

b) Special circumstances involved in a vehicle shooting,

c) One plane of impact (2 dimensional) requiring trigonometric calculation,

d) May possibly provide a preliminary estimation of the distance from which a shot pattern was fired, or

e) Capability to illustrate the bullet path photographically using:

1) Probes,
2) Yarn, or
3) Laser photography (using either the reflective method or the fog method).

3) Firearms at the Crime Scene-By properly documenting and safely unloading these firearms, the Firearm & Toolmark Specialist may, in some cases, be able to determine the sequence of shots fired.

C) Collection of Evidence-The Firearm & Toolmark Specialist can collect evidence such as:

1) Embedded projectiles requiring:

a) Proper use of hammer and chisel to avoid damaging the projectile,

b) Use of rotozip or reciprocating saw, or

c) Use of sifting screen.

2) Collection of submerged firearms-By properly packaging a submerged firearm, further corrosion of such a firearm can be kept to a minimum, or

3) Recovery of Victims' Clothing-Under normal circumstances, this will be done by the medical examiner. In some rare instances, it may be advantageous for the Firearm & Toolmark Specialist to collect them at the scene for muzzle-to-garment distance determination.

D) Interpretation of Evidence-When the caliber of a fired evidence bullet is not in question, the Firearm & Toolmark Specialist may be able to consult a General Rifling Characteristics File and provide a list of possible types of firearms which may have fired it.

Discipline Specific-Capabilities of the Microanalysis Specialist

A) Locating Evidence-The Microanalysis Specialist can locate trace evidence at the Crime Scene using one of the following methods:
- **1)** Visual search for 3-Dimensional (3-D) shoe impressions or tire impressions in mud, dirt, snow, etc,
- **2)** Visual search for 2-Dimensional (2-D) shoe impressions in dust or in blood using oblique lighting, etc,
- **3)** Search for paint chips, glass, plastic fragments, etc. at a hit & run scene, or
- **4)** Examination of suspect vehicle for evidence transferred from victim.

B) Enhancing Evidence-The Microanalysis Specialist can, in certain instances, improve the viability of evidence by one of the following methods:
- **1)** Amido Black reagent to enhance shoe impressions in blood, or
- **2)** Use of various lighting techniques to improve the contrast of shoe or tire Impressions.

C) Documenting Evidence-The Microanalysis Specialist can:
- **1)** Use photographic techniques to record 3-D shoe impressions, 2-D shoe impressions, or tire impressions prior to collection, or
- **2)** Properly measure and diagram vehicle wheel base and turning radius for comparison to known vehicle wheel base and turning radii.

D) Collecting Evidence-The Microanalysis Specialist can use the following techniques or equipment to collect evidence:
- **1)** Electrostatic Lifter or Gel Lifters to collect shoe impressions in dust, or
- **2)** Dental stone to cast shoe or tire impressions in mud, dirt, snow, etc,
- **3)** Latent lifts of dusted shoe impressions,
- **4)** Use of vacuum technique to collect hair or fiber evidence,
- **5)** Collection of glass evidence for:
  - **a)** Comparison to another sample or standard,
  - **b)** Fracture match,
  - **c)** Analysis of direction of force, or
  - **d)** Order of breakage.
- **6)** Collection of possible fracture match evidence such as: paint chips, torn paper, glass, tape, automobile parts, broken tools, etc,
- **7)** Collection of unknown substances for analysis or comparison,
- **8)** Collection of fire debris for ignitable liquid residue analysis, or
- **9)** Collection of gunshot residue by:
  - **a)** GSR Kit from subject or victim hands, or
  - **b)** GSR Adhesive stubs from surfaces other than hands.

E) Collecting Standards for Comparison-The Microanalysis Specialist can collect the following standards when appropriate:
- **1)** Subject or Victim Hair Standards,
- **2)** Fiber Standards,

3) Elimination Shoeprints,
4) Paint Standards,
5) Glass Standards,
6) Ignitable Liquid Standards, or
7) Printing of Suspect Vehicle Tires.

Results Generated for Each Crime Scene Processed:

A) Copy of Request for Technical Assistance Memo,
B) Copy of completed Laboratory Submittal Form,
C) Copy of completed Evidence Log,
D) Copy of detailed Crime Scene Narrative,
E) Copy of all finished Diagrams and Measurements,
F) Copy of Crime Scene Photos, and
G) Copy of Crime Scene Videotape.

EVIDENCE RECEIVING

- All evidence submitted to a Tennessee Bureau of Investigation Crime Laboratory **must** be in a container which is sealed. The only seals which will be accepted are:
    - Tape,
    - Heat Sealed Packages, or
    - Packages with *Tamper-Proof* Seals.

- For mailing purposes, place all sealed, packaged items into a strong, crush-proof, suitable sized cardboard box. An envelope may be used if there is no danger of damage from rough postal handling and the contents will not escape through the openings in the corners of the envelope.

- **Do not use plastic bags for bloody items or un-dried plant material.**

- All evidence seals **must** be initialed by the person sealing the package or placing a seal on the package. The initials **must** overlap the tape seal and the package.

- Only enclose evidence from one case per package. Generally speaking, a case is defined as an "incident". Do not package or mail multiple cases (or incidents) together.

- Place the Request for Examination form into an envelope addressed to the correct TBI Laboratory, and make sure your return address is clearly indicated. Tape this envelope to the **outside** of the evidence package.

- **Make sure that your agency name and case number is placed on the outer packaging.**

EVIDENCE RECEIVING

Evidence Receiving Units in the Tennessee Bureau of Investigation (TBI) Crime Laboratories will ensure proper evidence flow and tracking. The Evidence Receiving Units receive, distribute and return all evidence processed by the TBI Laboratory.

Forensic Technicians receive all evidence submitted to the laboratory and deliver it to the appropriate laboratory forensic scientist(s) after logging the case information into the Laboratory's Information Management System. Generally, the submitting officer will not meet directly with the forensic scientist(s) who will conduct the analysis. Exceptions to this practice may be made for individual cases when circumstances require the submitting officer to talk directly with the forensic scientist(s). If you feel you have a special need to discuss certain aspects of your case, you may request such a meeting with the forensic scientist(s).

EVIDENCE ACCEPTANCE POLICY

The TBI Laboratory accepts any evidence from Law Enforcement Agencies or Medical Examiners which meets the following criteria:

- The evidence has been obtained as the result of an official criminal investigation.

- The Tennessee Bureau of Investigation will not perform toxicology analysis on any Medical Examiner cases that are **non-criminal** in nature. The Bureau will only be able to perform analyses on criminal cases that have a law enforcement agency case number, or at the request of the appropriate District Attorney General.

- The investigating officer intends to pursue a criminal case pending the results of evidence analysis and/or the related investigation.

- The evidence has not been previously examined by another forensic scientist, unless prior approval has been requested and received from the TBI Assistant Director of the Forensic Services Division.

EVIDENCE SUBMISSION PROCEDURES

Any drug evidence greater than five (5) pounds must be hand delivered to the respective crime laboratory. All other criminal evidence types normally mailed; including TBI evidence collection kits such as Blood Alcohol/Toxicology, DNA, Sexual Assault Evidence Collection, Buccal Swab Collection or Gunshot Residue kits; will only be accepted if properly packaged and received from a commercial carrier that provides transfer documentation such as the U.S. Postal Service Registered and Express Mail, UPS, Federal Express, etc.

Personal delivery of evidence is the preferred method for any perishable evidence, evidence of significant monetary value, firearms, and large quantities of controlled substances.

Adherence to proper evidence submission procedures is essential for forensic scientists to evaluate evidence properly, to maintain the chain of custody, and to maintain the physical integrity and evidentiary value of submitted items. Failure to follow the laboratory's instructions when submitting evidence could result in the evidence being returned.

Should you have any questions as to the proper evidence submission procedures, it is recommended that you contact the laboratory serving your area.

Request for Examination Submission Forms

- Fill out the Request for Examination form **completely**, supplying all information requested.

The chain of custody of each piece of evidence submitted must be tracked while in the possession of the laboratory; therefore, do NOT use a separate page(s) for itemization of the evidence.

Either type the form or print it legibly.

Once the Request for Examination form has been completed, place it in a separate envelope and attach it to the outside of the package if mailing. For in-person submittals, the RFE form may be attached to the package itself.

Please contact the laboratory serving your area for additional forms and collection kits.

- Instructions for completing the Request for Examination form include:

  (1) **Requesting Officer:** Please use the same officer for all submissions in a given case. This simplifies keeping case records together, as well as grouping submissions on the laboratory report. The laboratory always returns evidence to the **originating agency** unless otherwise requested on the Request for Examination.

  (2) **TBI Lab Number:** If evidence has previously been submitted in a case and you know the laboratory number, please provide that number to the forensic technician receiving the case. If you do not know the specific number, please advise the forensic technician that other evidence has been submitted in the case.

  (3) **Race/Sex/DOB:** Provide this information for all suspects and victims as it is valuable in several kinds of laboratory analyses.

  (4) **Examination Requested:** Be as specific as possible. If you are not sure of what tests may be performed, please call the laboratory prior to completing the form, or refer to the appropriate sections of this guide for further information. Clearly state the analysis you need performed on each item of evidence. Clarify the request, if necessary, stating what you need to know from the analysis on the bottom of the form or on a separate sheet of paper.

  (5) **Where Recovered:** Give the exact location where the evidence was seized/collected [i.e., victim (name), suspect (name), bedroom, vehicle, etc.]. **Note: For the safety of all who might handle the evidence, <u>always</u> indicate when evidence was recovered or seized from a body cavity or contaminated area.**

  (6) **Disposition of Evidence:** Evidence cannot be stored at the laboratory; therefore, once the lab report has been received from the lab, evidence must be picked up by the submitting agency within thirty days.

  (7) **Statement of Facts:** Briefly describe in the submission form what happened. Supply sufficient detail to illustrate how the evidence submitted relates to the investigation. A copy of your investigative report may suffice if it contains that information. Be sure to specify why you are submitting each item so that forensic scientists may conduct appropriate examinations.

Procedure:

- **Inspect evidence for proper packaging and seal.** An evidence package is considered sealed only if its contents cannot readily escape and if entering the container results in obvious damage/alteration to the seal. Zip-locked seals are not proper seals and must also be taped. **Do not use staples.**

- Do not allow submission forms, packages, or other cases you may be transporting to become contaminated by biological or other potentially hazardous evidence. Keep all submission documents and other evidence away from contaminated evidence when preparing evidence for submission to the laboratory or transporting evidence to the lab. For safety reasons, stained submission documents will not be accepted by the laboratory.

Evidence Packaging:

- Package and seal each item individually as appropriate for that type of evidence. Make sure that your agency name and case number is placed on the outer packaging. See specific sections of this guide for more detailed instructions. One basic rule of evidence packaging is:

  Do not use plastic bags for bloody clothing or plant material that hasn't been dried.

- Mark each item with the item number you listed on the Request for Examination form, your name or initials, and your case number. Complex item numbers which include both letters and numbers (e.g., FRM-1-360) create tracking problems within the laboratory. Please limit item numbers to simple numbers that run in numerical order.

- Seal and package evidence with protective padding to prevent breakage, leakage, cross-contamination or deterioration. Note: An evidence package is considered sealed only if its contents cannot readily escape and if entering the container results in obvious damage/alteration to the seal. Zip-locked seals are not proper seals and must also be taped. **Do not use staples.**

  REMEMBER: All seals must be initialed (with permanent ink) by the individual sealing the evidence, and the initials must be on the tape. It is a good idea to initial the seal in such a manner that the initials extend off of the tape onto the package.

- When possible, place all sealed items that will be processed by a single laboratory section into one container (e.g., envelope, bag, box) and seal

that container. For example, in a drug case involving four separate items, seal each item individually and then place it together with the other three into one larger container. Identify the container as to what items are inside.

- If you submit numerous items in a case for examination by separate sections of the laboratory, divide the items into sealed containers according to the laboratory sections that will receive the evidence. This helps to maintain the chain of custody, as persons in the chain but not involved in evidence analysis, need not open and mark each individual item.

In-Person Submissions:

- Submit the Request for Examination forms to the laboratory.

- Personal delivery of evidence is the preferred method for any perishable evidence, evidence of significant monetary value, firearms, and large quantities of controlled substances.

- **Weapons should be unloaded prior to submission; however, if the weapon is loaded due to a technical reason, advise lab personnel immediately upon your arrival. See Firearms guidelines.**

- If a weapon cannot be unloaded or should not be unloaded for technical reasons, laboratory personnel will be made available to assist you.

Mail Submissions:

- **Only enclose evidence from one case per package. Generally speaking, a case is defined as an "incident". Do not package or mail multiple cases (or incidents) together.**

- Place all sealed, packaged items into strong, suitable sized cardboard boxes. An envelope may be used if there is no danger of damage from rough postal handling, and the contents will not escape through the openings in the corners of the envelope.

  Pad the evidence to prevent shifting or damage during mail handling. Seal the container adequately with strong tape and **initial the seals**. Wrap boxes with brown paper whenever possible.

- Place the Request for Examination form into an envelope addressed to the correct TBI Laboratory, and make sure your return address is clearly indicated. Tape this envelope to the **outside** of the evidence package.

- Mark the outside of the package "Attention: Evidence Receiving".

- All TBI Crime Laboratories will accept evidence that is properly packaged and received from a commercial carrier that provides transfer documentation such as the U. S. Postal Service Registered and Express Mail, UPS, Federal Express, etc.

- Any drug evidence greater than five (5) pounds **must** be hand delivered to the respective crime laboratory.

- If submitting live ammunition by mail, check with the commercial carrier to ensure proper labeling of the package.

- Any package containing biological materials or materials exposed to biological contamination **must** be properly identified as **"BIOLOGICAL HAZARDS"**.

Evidence Submission Checklist:

- Is the Request for Examination Form **completely** filled out?

- Have you indicated the type analysis needed for each item of evidence?

- Is biohazardous evidence properly packaged?

- Is each item of evidence marked and packaged separately and sealed?

- Is the overall package properly sealed and marked?

- Is the Request for Examination form in an envelope attached to the **outside** of the main package so that the sealed evidence package will not have to be opened to remove the forms?

- Is the return address legible?

- Has the appropriate postage been affixed?

Change in Case Status/Information

If the status of a case or the progress of an investigation changes and there is no longer a need for the evidence to be analyzed, please advise the laboratory of the change by contacting the laboratory working your case. Knowing that the analysis is no longer needed will free valuable analysis time for other cases.

Requests to correct erroneous information after submitting the original Request for Examination form must be made in writing by the officer or agent who made the initial request. Such requests can be made by contacting the laboratory working your case. The request must refer to the erroneous information which appeared on the submitted form, and specify the appropriate change(s).

Protection of Evidence from Degradation or Contamination

It is the responsibility of the laboratory to ensure; insofar as reasonable and possible, that evidence does not undergo degradation or contamination while in our possession.

However, proper collection and packaging of evidence are the responsibilities of the submitting officer. One of the purposes of this field guide is to make investigators aware of how to handle certain evidence to prevent deterioration or contamination prior to its arrival at the laboratory.

If evidence is packaged improperly or placed into a container in which the evidence will deteriorate, the submitting officer may be asked to repackage the evidence prior to submission.

SEROLOGY/DNA EVIDENCE

- Items found at different locations must be placed in separate paper containers.

- Latex gloves should be worn at all times. Gloves should be changed between the collection of **each** item.

- Wet, bloodstained evidence items must not be stored where they may come into contact with any other evidence.

- Wet garments (from blood or other sources) must be air-dried in a protected environment without the use of heaters and fans.

- Known standards (blood or buccal swabs) should be collected from all relevant people involved in the case. DNA analysis will not proceed without standards from all relevant persons.

- Liquid blood samples should be kept under refrigeration prior to submission to the lab and should be submitted as soon as possible.

- To maintain the integrity of the sample, evidence that has been returned to the agency should be stored in a cool, dry location or, if possible, refrigerated.

- Cases where a toxicology screen is necessary should have the blood sample drawn and submitted separately from the Sexual Assault Collection Kit. Toxicology samples should be collected using the TBI Blood Alcohol/Toxicology Evidence Collection Kit.

- Serology/DNA cases which do not involve other lab disciplines, such as Firearms, Latent Prints, or Trace Evidence, must be submitted to the regional crime lab in the agency's geographical area (Knoxville, Memphis, Nashville).

SEROLOGY/DNA UNIT

Capabilities and Services

Forensic Scientists assigned to the Serology/DNA Unit assist in the investigation of such crimes as: homicides, sexual assault, breaking and entering, and assault. Services provided from this unit include the identification of the body fluid (blood, semen or saliva) and perform DNA typing tests to determine whom the potential donor of that body fluid may be. Crime scene assistance is also provided by this unit and may be requested by any law enforcement agency in Tennessee. If such assistance is needed, the request should be channeled through the Assistant Director of Forensic Services.

*No Suspect DNA Casework

Cases with no suspects may be profiled after a request from the District Attorney General if a victim's standard is available. The results can them be entered into CODIS.

Exceptions may be made on a case-by-case basis.

* No Suspect cases are cases where law enforcement has not developed a suspect, or cases in which a suspect has been eliminated through testing or other investigative means.

Post-Conviction DNA Testing

Post-Conviction DNA Testing will only be performed upon receipt of a Court Order or an Agreed Order. As per TBI Serology/DNA Unit Policy, the standards for comparison listed below may be required prior to DNA testing. *It is preferred that both victim and subject standards be submitted prior to DNA Analysis.* Without these standards, final results may not be interpretable and/or statistical assessment may not be possible.

1. Subject(s) Standard(s),
2. Victim(s) Standard(s),
3. Other Elimination Standards, or
4. Biological Parental Standards.

Evidence Submission Guidelines

Please submit evidence that is relevant to the case. Remember the purpose of testing is to establish a transfer of body fluids between the victim and suspect or between the bleeder and crime scene. An example of irrelevant evidence might include looking for the victim's blood on his own clothing or the suspect's semen on his own clothing or bedding.

Handling of Evidence

Latex gloves should be worn at all times. Gloves should be changed between the collection of each item. If any item has been previously tested for blood (e.g., TMB, phenolphthalein or Luminol) please inform lab when submitting evidence.

Clothing

Allow clothing to air-dry before packaging in a paper container. Lay the clothes out flat; do not fold them. Submit the entire article of clothing. If the clothes must be cut off, never cut through existing holes such as knife or gunshot holes.

Wet Blood Stains

If the entire item can be collected, do so. Remember to air-dry the bloodstain on the item thoroughly before packaging it in a paper container. Never apply heat to dry an item.

If a wet stain is present and the whole item cannot be seized, the stain can be removed using a clean, sterile cotton swab.

Dry Stains

The best choice is to collect the entire article; however, there are times when this is not practical. If a stain must be cut out of an article such as a carpet, cut the **ENTIRE** stain. If multiple areas are being cut out of an article, clean the cutting instrument (preferably with alcohol) before going to the next area to avoid cross contamination.

If an article cannot be removed entirely or cannot be cut, the sample may be absorbed onto sterile swabs. Place a drop of sterile or distilled water on the swab.

Swab the stain until the stain is no longer visible or until the swab becomes saturated with stain. If possible, collect at least two swabs. If the sample is very small, be very careful not to dilute the sample. Collect the stain on the very tip of the swab until the swab tip is dark in color. Remember it is better to have a small dark stain than a large light stain which may be less suitable for examination.

Standards

Known standards (blood or buccal swabs) should be collected from all relevant people involved in the case. If an individual did not bleed, but his/her clothes are being sent in for comparison purposes, his/her standard should also be sent for elimination purposes.

Liquid blood samples should be kept under refrigeration prior to submission to the lab and should be submitted as soon as possible. **Never freeze liquid samples.**

A blood sample can be collected in any size purple top (EDTA) tube. Buccal swabs can be collected using sterile cotton swabs submitted in a paper envelope. (Do not use Arrestee Kits)

Alternate Standards

If no blood sample is available due to complete examination (loss of blood) or if an individual has been transfused, alternate standards may be obtained which can include:

1. An article of clothing that is stained with what is expected to be the individual's own blood.

2. If the individual has been transfused but is still alive, wait 120 days to draw a purple top (EDTA) tube of blood.

3. If the corpse is bled out or is decomposing, ask the pathologist for some deep-seated muscle and a piece of skin. These samples **must be frozen** prior to submission to the lab and must be hand-delivered.

Sexual Assault Cases

1. Take the victim to the hospital as soon as possible to have a Sexual Assault Kit collected. Do not let the victim clean up prior to going to the hospital. Evidence could be lost by allowing the victim to clean up.

2. If a suspect is apprehended, either consent or a search warrant will allow the collection of a standard sample. Do not package subject's blood inside victim's kit.

3. Additional articles which may bear body fluids may be collected by the responding officer or crime scene unit.

4. Blood soaked items should be air-dried without heating before being submitted in sealed paper bags. If your agency does not have a facility for drying items, please contact the DNA Unit at the appropriate laboratory for instructions.

5. Cases where a Toxicology screen is necessary should be submitted separately from the Sexual Assault Collection Kit. Toxicology samples should be collected using the TBI Blood Alcohol/Toxicology Evidence Collection Kit.

Fingernail Evidence

The Serology/DNA Unit often gets requests to look for tissue from under the fingernails of victims who have scratched their attacker. DO NOT COLLECT fingernail scrapings; however, if a large clump of tissue is found under the fingernail, the tissue can be collected with a sharp pair of tweezers. This will ensure that you do not contaminate the suspect's tissue with the tissue of the victim. Place this in a sealed container and label it properly.

If the victim is deceased, you should "BAG" the hands and let the medical examiner collect the samples.

Trace DNA Evidence

Items submitted to the laboratory for collection of trace DNA evidence should be preceded by a phone call to the Serology/DNA unit. Not all evidence will lend itself suitable to this type of testing. Items that have a smooth surface, such as cartridge casings, are far less likely a source of DNA than a roughened surface, such as fabric. Due to the costs and time involved in DNA analysis, please limit the number of samples submitted for trace DNA evidence. If a large number of items are submitted, a phone call will be made to the submitting officer to narrow down the items tested to those most relevant or able (in the analyst's judgment) to yield a usable DNA profile.

Any questions regarding trace DNA evidence may be addressed to the Serology/DNA Unit.

Cigarette Butts

While wearing latex gloves, pick the butts out of the ashes and place in an envelope. If the victim or suspect is a smoker, determine his/her brand preference and indicate it on the envelope or submission sheet.

PACKAGING:

1. Submit biological evidence as quickly as possible after it is determined what questions in a case may be answered by DNA analysis. Do not submit blood just because it is found and collected; determine if analysis is needed, then submit the sample(s) as quickly as possible.

2. Submit autopsy samples as soon as possible, since they begin to degrade immediately upon death of the donor.

3. Place each item collected in its own sealed container. Do not package several items together. An exception to this rule may be made if the item is blood-soaked and still wet. These wet items can be placed in Plastic Biohazard Bags for transport to a facility where they can be air-dried before placing in paper containers for submission.

4. Always package in paper. Never use plastic bags, as they promote bacterial growth.

5. Pad fragile and sharp articles so that they will not break or penetrate the packaging. Corrugated cardboard is good to use with these items.

6. Air-dry all evidence.

7. Store evidence in a cool and dry location.

8. Always seal the packaging and initial the seal prior to submission. Items not sealed properly will not be accepted by the Evidence Receiving Unit.

SUBMISSION:

The depth and scope of examinations selected by the forensic scientist for a given case depends to a large extent on the amount of information provided by the submitting officer. It is imperative, therefore, to include a complete description of the crime on the Examination Request Form or to attach a copy of the investigative report. Forensic scientists need to know for example:

How many people could have bled;

What the officer believes happened and what he/she seeks to prove by the analysis; and

What, if any, unusual circumstances may have affected the blood stains such as soaking, heating or contamination.

Complete information is also essential in making determinations in sexual assault cases as to the donor of any semen detected. Since, in these cases, one is dealing with a mixture of body fluids from at least two individuals, the forensic scientist **MUST** know if the victim had sexual intercourse with any other individuals in the 72 hours prior to the assault. Other important information to gather may include:

Did the subject ejaculate?

Was the subject wearing a condom?

What body cavities were penetrated?

Did ejaculation take place outside the body, and if so, where was the semen deposited? and

Does the suspect deny having sex with the victim?

Many of these questions must be answered before analysis can be completed.

Safety Consideration for Biological Evidence

A number of potentially deadly hazards are associated with body fluid evidence. Bear in mind these safeguards which apply to all persons handling evidence possibly containing body fluids.

1. Always assume that unknown samples may be infected and handle the evidence accordingly. Use gloves. Do not smoke, drink or eat until after removing the gloves and washing hands. Do not agitate the stain and avoid flaking off fine particles that float in the air.

2. Whenever possible, check with the victim(s) and suspect(s) to determine if they have any communicable disease(s) such as, but not limited to: AIDS, hepatitis, TB and/or venereal disease. Note this on the Examination Request Form.

FIREARM AND TOOLMARK UNIT

- Always assume the weapon is loaded and ready to fire.
- Always be prepared for the weapon to fire.
- Always point the weapon in a safe direction.
- Collect all relevant live ammunition at a crime scene for use as standards.
- Do not mark cartridge cases or bullets in any manner.
- Whenever possible, collect the item(s) containing the toolmark(s).
- Package all toolmark evidence separately. Package the working end of a suspect tool to prevent damage to the working surface and to prevent loss of possible trace evidence.
- When submitting evidence for entry into the Integrated Ballistics Identification System (IBIS) only, no other laboratory analysis will be performed. If other analyses are requested, indicate that on the Request for Examination form.
- Types of evidence suitable for entry into IBIS include:

    1. Shootings that have the potential of being a serial type (such as homicides, gang-type, drug related, drive-by shootings and robberies).

    2. Confiscated firearms (from drug or gang suspects, vehicle stops, recovered stolen firearms).

    3. Non-police firearms from officer involved shootings.

FIREARM AND TOOLMARK UNIT

Capabilities and Services

- Determine whether a bullet, cartridge case, or shotshell was discharged from or in a particular firearm.
- Determine if a particular toolmark or tool impression was made by a specific tool.
- Determine if a broken part or piece of a tool or firearm was once a part of a particular tool or firearm.
- Determine if a gunshot residue pattern is present on a given article (e.g., clothing, bed sheets, curtains) and, if present, determine how far a specific firearm muzzle was from the article at the time of firing.
- Identify bullets and/or cartridge cases as to type, caliber, and possible manufacturer. Provide listings of type, make, or caliber of firearms that may have fired a particular bullet.
- Determine shot size, wadding, gauge, and possible manufacturer.
- Perform serial number restorations on firearms and other items.
- Determine trigger pull weight and if a firearm functions properly.
- Utilize the Bureau of Alcohol, Tobacco and Firearms to trace ownership of a particular firearm.
- Provide assistance at crime scenes pertaining to forensic firearms and/or toolmarks.
- Make submissions of fired bullets and cartridge cases to the Integrated Ballistics Identification System (IBIS).
- Maintain an open case file of bullets and cartridge cases involved in unsolved cases and do automated checks against firearms as well as other bullets and cartridge cases against these unsolved cases using IBIS.
- Maintain a firearms reference collection.
- Maintain an ammunition reference collection.

Type of Analyses or Examinations:

Firearm or Ammunition Cases

Bullets, cartridge cases, and shotshells are compared to a suspected firearm in the following manner: forensic scientists fire test cartridges of the same manufacturer, caliber or gauge, and bullet type or shot size from the suspect firearm. The test bullet, cartridge case or shotshell is next compared microscopically with the submitted evidence bullet, cartridge case, or shotshell.

Toolmark Cases

In toolmark examinations, forensic scientists microscopically compare test toolmarks made with a suspect tool to submitted toolmarks. Generally, toolmarks fall into two categories: impressions or striated.

Please note that it takes a considerable length of time to reproduce questioned toolmarks with a particular tool. Therefore, do not submit a toolmark for comparison with a tool left at the scene of a crime unless the suspect tool can be connected to a suspected perpetrator through investigation.

Gunshot Residue Pattern Analysis

Gunshot residue pattern analysis helps reconstruct aspects of a shooting, especially distance determination. Articles submitted for analysis are chemically treated with solutions capable of indicating the presence of nitrites from gunpowder or lead particles and vapor. If a gunshot residue pattern is located, the suspect firearm is test-fired at various distances using the type of ammunition used in the crime. These test-firings produce standard test cloths. The gunshot residue pattern on test cloths that most resembles the pattern on the evidence provides an approximate distance of the firearm muzzle at the time of firing.

Firearm Serial Number Restoration

Obliterated serial numbers prevent investigators from tracing firearms. The serial number may have been filed, punched, or even treated with acid. An examiner can frequently obtain an obliterated serial number through a process known as chemical etching. Once the serial number is restored, a weapon can be traced and determination of whether it has been stolen can be made.

Note: Please submit other types of serial number restorations to the Firearms Unit also.

Integrated Ballistic Identification System

Integrated Ballistic Identification System (IBIS) is an automated computer system that captures the individual signatures of fired bullets and cartridge cases and stores them in a database. The system is designed to run correlations on these signatures to determine any possible matches.

Evidence Submission

Proper collection, marking and handling of firearm and toolmark evidence makes the forensic scientist's work easier and ensures a more complete examination. Please observe the following general guidelines for proper collection, working, and handling of fiream and toolmark evidence.

Firearms

- Never place anything into the barrel of a suspect firearm.
- If the submitting officer deems it necessary to have the firearm processed for latent prints, handle the firearm only by those areas that normally do not yield fingerprints (e.g. checkered grips, edges of the trigger guard, or any knurled area).
- Carefully unload the weapon at the scene.
  Note: On rare occasions, weapon may be rusted or jammed, making it impossible to unload the weapon at the scene. In these instances notify the Firearms Unit of the laboratory serving your area.
- On revolvers, note which chamber was under the hammer and/or the location of discharged and live cartridges in relation to that chamber. On pistols and other weapons that load by magazine, remove the magazine and live cartridge from chamber.
- Use care in marking firearms. Usually the side plate of revolvers and the slide area of automatics are the best locations for identifying marks. Be careful not to destroy any trace evidence when marking a firearm. If the firearm is to be examined for latent prints, do not mark the weapon, place all necessary information on a tag and attach the tag to the weapon. If possible, record the serial number, make and model of the submitted weapon in your notes.
- Collect firearms separately in a paper or plastic bag or cardboard box. Do not use plastic bags for firearms that are being submitted to the Latent Evidence Unit, Trace Evidence Unit, or Serology/DNA Unit.
- Firearms discovered in water should be submitted submerged in the same water in a watertight container.

Bullets, Cartridge Cases, and Shotshells

- Collect all relevant live ammunition at a crime scene for use as standards.
- Do not mark cartridge cases or bullets in any manner. Place them in individual envelopes and place all necessary identification data on the outside of these envelopes. This process prevents accidental marring of the important surfaces of the bullet and/or cartridge case and accidental destruction of trace evidence. All containers should be sealed and initialed.
- When collecting bullet, cartridge case, shotshell, and similar evidence at a crime scene, do not attempt to wash or clean the evidence.

- Do not place cotton or tissue around bullets, as this material may adhere to blood or other matter on the surface of the bullet.
- At autopsies, we request that pathologists attempt to clean blood or other body fluids off the evidence prior to packaging.

Examination of Gunshot Residue Evidence

- Air-dry clothing or other articles submitted for gunshot residue pattern examinations.
- Mark each piece of evidence for identification using a tag and attach the tag away from any bullet holes, powder, or blood.
- Place each piece of evidence in separate, sealed paper bags. Never use plastic bags to store gunshot residue evidence.
- Always wear protective latex gloves when handling bloody items. Handle articles carefully, as shaking or brushing may remove evidence.

Toolmark Evidence

- Whenever possible, collect the item(s) containing the toolmark(s).
- In the case of extremely large or immovable items, either remove that section of the item containing the toolmark or make a cast of the toolmark using Mikrosil, silicone rubber, or other suitable casting material.
- Package all toolmark evidence separately. Package the working end of a suspect tool to prevent damage to the working surface and to prevent the loss of possible trace evidence. Do not use tape to cover or protect the end.
- Never touch or fit a suspected tool to a toolmark.
- Never clean a tool or a cast of a toolmark yourself. Submit the evidence, as is, to the laboratory.
- Never make your own test marks with a suspect tool.
- Mark all containers for identification and make sure they are properly sealed.

Test Bullets and Cartridge Cases/Evidence Bullets and Cartridge Cases for Entry into IBIS ONLY

- Use one Request for Examination Form for each case to be submitted.
- When submitting evidence for entry into IBIS only, no other laboratory analysis will be performed.
- If there is a need for other laboratory analyses to be performed on the submitted evidence, mark that on the Request for Examination form.

- If submission of the weapon is not possible, submission of the test-fired bullets and cartridge cases is permissible, assuming the proper procedures are followed. It is mandatory that Agency Case number, incident/recovery date and make, model and serial number of the firearm are provided.
- Only the calibers listed under the following heading will be accepted for entry into the IBIS. Also provided is a list of recommended ammunition that should be used when test firing.
- Types of cases suitable for entry into IBIS include:

    1. Shootings that have the potential of being a serial type (such as homicides, gang-type, drug-related, drive-by shootings and robberies).

    2. Confiscated firearms (from drug or gang suspects, vehicle stops, recovered stolen firearms).

    3. Non-police firearms from officer involved shootings.

- IBIS is state-of-the-art technology. This technology is changing at a rate much faster than procedure manuals may be written. If you have any questions about the system, contact the TBI Firearm and Toolmark Unit at the laboratory serving your area.

IBIS STANDARD AMMUNITION PROTOCOL

A.1-Standard Ammunition Protocol Table for Revolvers/Pistols

CALIBER CLASS	BRAND OF AMMUNITION TO USE
.22 Caliber	**Remington** .22 Standard Velocity Lead Round Nose **CCI** .22 Mini Mag Copper Coated Round Nose
.25 Auto	**Remington, PMC, UMC** 50 grain metal case, FMJ
.32 Auto	**Remington, UMC or PMC,** FMJ
.32 S&W	**Remington** Lead Round Nose, 88 grain lead **Winchester** Copper Coated Lead round Nose
.32 S&W Long	**Remington**, 98 grain Lead round Nose **Winchester** Copper Coated Lead round Nose
.380 Auto	**Remington** or PMC 95 grain FMJ **UMC** 95 grain Metal case
9mm Luger	**Remington or PMC 115** grain FMJ **UMC** 115 grain metal case
9mm Makarov	**CCI** 95 grain FMJ or **Federal** 90 grain JHP
.38 Special	**Remington** or UMC 158 grain Lead Round Nose **CCI** .38 Spl. +P JHP **Remington** FMH or **Hornady** .38 Spl. 158 grain JHP
.357 Magnum	Same as .38 Special
.357 Sig	**Remington** 125 grain JHP **UMC** 125 grain Metal Case **Federal** 180 grain FMJ
.40 S&W	**Remington** 180 grain JHP **Federal** 180 grain JHP **UMC** 180 grain Metal Case
10mm	**Remington** 180 grain JHP or **UMC** 180 grain metal case **Remington or PMC** 200 grain metal case
.41 Magnum	**Remington** 210 lead or JSP **PMC** 210 grain lead or JHP
.44 Magnum	**Remington** 240 grain Lead semi-wadcutter or JSP **CCI Blazer or PMC** .44 Special 180 grain JHP **Remington or CCI Blazer** .44 Special 246 grain lead
.45 Auto	**Remington or PMC** 230 grain metal case **UMC** 203 grain metal case

Abbreviations:

UMC-Union Metallic Cartridge
PMC-Precision Metal Corporation
CCI-Cascade Cartridge Industries
FMJ-Full Metal Jacket
JHP-Jacketed Hollow Point

Report Interpretation

Firearm Examinations

- Class characteristics: measurable features of a specimen, which indicate a restricted group source. The class characteristics of firearms may include the caliber, the number of lands and grooves, the widths of the lands and grooves, direction of rifling twist, size and type of firing pin, and position and type of extractor and/or ejector.
- Individual characteristics: imperfections or irregularities produced accidentally during manufacture or caused by use, abuse, corrosion, rust, or damage. Individual characteristics are unique to an object and distinguish it from all other objects.

Bullets, Cartridge Cases, and Shotshells Compared to a Suspect Firearm

- Positive Result: The bullet, cartridge case, and/or shotshell was fired from and/or chambered in the suspect firearm. The bullet, cartridge case, and/or shotshell has the same class characteristics as the suspect firearm and sufficient matching individual characteristics to make an identification.

- Inconclusive Result: The bullet, cartridge case, and/or shotshell has the same class characteristics as the suspect firearm, but lacks sufficient similar individual characteristics or has no discernible individual characteristics permitting a positive identification or elimination.

- Negative Result: The bullet, cartridge case, and/or shotshell was not fired in or from the suspect weapon. The bullet, cartridge case, and/or shotshell have different class characteristics than the suspect firearm or the individual characteristics are so different as to preclude an "inconclusive result".

Toolmarks Compared to a Suspect Tool

- Positive Result: The suspect tool made the toolmark. The toolmark has the same class characteristics as the suspect tool (e.g., shape, size, manufacturing marks, etc.) and a sufficient number of matching individual characteristics to make an identification.

- Inconclusive Result: The toolmark displays the same class characteristics or some of the class characteristics of the suspect tool, but lacks sufficient similar individual characteristics or has no discernible individual characteristics permitting a positive identification or elimination.

- Negative Result: The suspected tool did not make the toolmark. The toolmark either has different class characteristics than the suspect tool or the individual characteristics of the toolmark are so different as to preclude an "inconclusive result".

Firearms Reference Collection

The Firearm and Toolmark Unit maintains a reference collection of firearms confiscated by state and local law enforcement agencies.

This important reference collection:

1. Serves as a parts source to enable test firing of broken or incomplete weapons submitted as evidence in criminal cases;

2. Provides an information source for comparisons against factory markings and serial number stamping practices when these markings have been obliterated or altered on evidence exhibits; and

3. Provides weapons for research projects in the field of firearms and ammunition identification and weapons for initial and in-service training of firearm and toolmark examiners.

Firearms may be submitted to the Firearm and Toolmark Unit Firearms Reference Collection by any law enforcement agency. It is imperative; however, that submitted firearms be accompanied by a court order authorizing the TBI Firearm and Toolmark Unit to either [a] maintain the firearm(s) in the reference collection and/or [b] to destroy firearms serving no useful purpose.

FORENSIC DRUG CHEMISTRY UNIT

- The Forensic Chemistry Unit accepts evidence if a criminal arrest has been made or is anticipated, or as part of a death investigation.

- The Tennessee Bureau of Investigation will accept drug evidence that is properly packaged and received from a commercial carrier that provides transfer documentation such as the U.S. Postal Service Registered and Express Mail, UPS, Federal Express, etc. Any drug evidence greater than five (5) pounds must be hand delivered to the respective crime laboratory.

- Fill out the Request for Examination form completely and neatly prior to submission.

- Evidence seized from body cavities or evidence contaminated with body fluids or biological waste should be clearly marked as a biohazard and notations concerning this evidence should be made on the Request for Examination form.

- Submit the best evidence in each case, omitting drug paraphernalia, powder residues and cigarette butts.

- Be sure that all items are properly separated and sealed to prevent cross contamination.

- Avoid sending plants (including marijuana, mushrooms, and cacti) to the laboratory unless they have been thoroughly dried.

- The Forensic Chemistry Unit will not accept hypodermic syringes or their contents for analysis unless the importance of such evidence is essential to a criminal prosecution, and the District Attorney or an Assistant District Attorney makes a written request for analysis.

FORENSIC CHEMISTRY UNIT

Capabilities and Services:

Analyses to determine the presence of controlled substances.

Evidence Submission Guidelines

- The Forensic Chemistry Unit accepts evidence if a criminal arrest has been made or is anticipated, or as part of a death investigation. Evidence from concerned parents, schools, organizations, private citizens, found property, and evidence that has no value for criminal prosecution will not be accepted.

- The Tennessee Bureau of Investigation will accept drug evidence that is properly packaged and received from a commercial carrier that provides transfer documentation such as the U.S. Postal Service Registered and Express Mail, UPS, Federal Express, etc. Any drug evidence greater than five (5) pounds must be hand delivered to the respective crime laboratory.

- When submitting sizeable quantities of any drug, you must contact the laboratory in your service area to schedule an appointment for personal delivery.

- Fill out the Request for Examination form completely and neatly prior to submission.

- Drug evidence seized from different people should be submitted on separate Request for Examination forms, even if the people were arrested at the same time or at the same incident. This procedure will result in separate laboratory reports being issued for each person, which will avoid problems and confusion in subsequent judicial proceedings.

- Drug evidence seized from the same person on different dates should be submitted on separate Request for Examination forms.

- Evidence seized from body cavities or evidence contaminated with body fluids or biological waste should be clearly marked as a biohazard and notations concerning this evidence should be made on the Request for Examination Form. Submit the best evidence in each case, omitting drug paraphernalia, powder residues and cigarette butts.

- Be sure that all items are properly separated and sealed to prevent cross-contamination. Place each item into separate containers and seal all items into one tape sealed container for submission to the laboratory if possible. Be sure that all seals are dated and initialed and that the evidence is marked with the subject's name and the agency case number.

- Avoid excessive use of tape on evidence packages. Close and seal evidence containers carefully, but not so as to make them difficult to open without damaging the contents.

- Never enclose tablets, cigarettes, or powder residues in tape. It is best to submit tablets and capsules in crush proof containers such as vials or small boxes.

- Avoid sending plants (including marihuana, mushrooms, and cacti) to the laboratory unless they have been thoroughly dried. Green plants, which are sealed in plastic bags will decompose, destroying their evidentiary value.

- Avoid submitting entire marihuana plants and plants with roots still attached. The charge of manufacturing does not require a weight; therefore, a representative sample is sufficient. If a count of the plants is required to determine the class of felony, it should be made at the time of confiscation.

- Submitting representative samples in large marihuana cases or bundle cases is recommended. A total weight may be obtained by weighing the marihuana on a certified scale in your area.

- Do not send obviously non-controlled items to the laboratory. Most pharmaceutical dosage units are plainly marked. Consult the Physician's Desk Reference (PDR) or other publication to rule out the non-controlled drugs before submission.

- When requesting both latent print and controlled substances testing in a case, the evidence must be separated prior to submittal to the laboratory. If the controlled substance and packaging are not separated, the submitting officer must choose which analysis will be performed (either drug testing or latent processing).

- Only samples from a clandestine laboratory site that are suspected of containing the manufactured controlled substance (such as methamphetamine) or the immediate precursor (such as ephedrine or pseudoephedrine) should be submitted. Samples of any acids, bases, solvents, and chemicals such as iodine, sodium metal, lithium metal, etc. will not be analyzed and should not be submitted. Liquid samples, no larger than approximately 40 mls., that are suspected of containing the controlled substance or the precursor should be submitted in glass screw cap vials enclosed in plastic screw cap vials. All of the finished product such as methamphetamine powder can be submitted for weight and analysis.

- Quantitations of controlled substances are not routinely performed.

- The Forensic Chemistry Unit will not accept hypodermic syringes or their contents for analysis unless the importance of such evidence is essential to a criminal prosecution, and the District Attorney or an Assistant Attorney General makes a written request for analysis.

Limitations to Evidence Submission

- The Forensic Chemistry Unit generally will not identify more than three items from the Controlled Substances Act per suspect in any given case unless analysis of the additional items will shift the charge from a misdemeanor to a felony (as in the case of marihuana) or in Schedule I and II drugs where amount could affect the class of felony.

- When two or more subjects are charged collectively with the same items, the group will be treated as a single individual for purposes of analysis.

- Only sufficient items to constitute a felony will be analyzed in large pharmaceutical controlled substances cases such as drugstore burglary cases.

- Because the laboratory has a limited storage capacity, bulk quantities of controlled substances may be sampled or analyzed by a forensic scientist and returned to the submitting officer on the same day if possible. To ensure that a forensic scientist is available, contact the Forensic Chemistry Unit before transporting this evidence to the laboratory.

- Evidence in product liability cases, drug residues on currency, and cases involving stomach contents (lavage) will not be analyzed.

Report Interpretation

- The Forensic Chemistry Unit reports results as to the controlled substances present, their schedule, and amount.

- Forensic scientists occasionally do not report measured weights for small amounts of marihuana and powders. In some cases, the chemist reports a small amount, trace, or residual quantity.

- Any weight listed on the laboratory report shows only the weight of the material identified and does not include the weight of the bags, containers and wrappings unless specified in an accompanying remark.

- Particular salt forms of a drug are not usually reported. For example, cocaine hydrochloride would generally be listed on the laboratory report only as cocaine. The form of cocaine, more commonly known as “crack”, will be listed as cocaine base when such identification is possible and the weight is 5.0 grams or greater.

- Please contact the Forensic Chemistry Unit for assistance if you have any questions on the submission of evidence for controlled substance analysis.

LATENT PRINT UNIT

- Always process surfaces suspected to have been handled.

- Develop a routine or pattern in fingerprint processing to ensure each scene is completely examined.

- Supply the following information on all lifts:

    (1) The name (or initials) of the individual making the lift;

    (2) The date the lift was made;

    (3) A case number or other identifying number;

    (4) An indication of where the lift was obtained (description or diagram); and

    (5) Duplicate lift notation.

- DO NOT process or attempt to lift prints in blood. Allow bloody items or prints to air-dry naturally and photograph if possible. Do not dry with forced hot air (e.g., hair dryer).

- Send all known fingerprints used for latent comparison purposes directly to the Evidence Receiving Unit.

- Submit a suspect's full name, race, sex, and date of birth.

LATENT PRINT UNIT

Capabilities and Services

The Latent Print Unit provides assistance in the analysis of any item of evidence which falls into one or more of the following categories:

- Latent Fingerprints
- Latent Palm Prints
- Latent Footprints (bare feet)
- Identification of Unknown Deceased Individuals

The term "latent" refers to hidden or invisible impressions. The term "patent" refers to visible impressions. Please note that throughout the following guidelines, "latent" refers to both visible and invisible impressions.

Latent fingerprints, palm prints, and footprints can be of sufficient value for positive identification purposes. Such evidence can indicate that an individual's finger, palm, or foot *did* make the impression in question.

Processing for Latent Prints at Crime Scenes

Process surfaces suspected to have been handled, even if the evidence has a surface believed to be a poor medium for latent prints. Most fingerprint technicians have been surprised at one time or another by a surface from which an identifiable latent print has been recovered.

Most crime scene processing for latent prints consists of using photography and powders. Latent print processing with powders involves the gentle application of powder to the slightly adhesive skin oils left on the surface of non-porous items (glass, plastic, metal, etc.).

Powdering and lifting latent prints takes practice and it is recommended that training include a variety of shapes and surfaces likely to be encountered at a crime scene. Remember, once a print is destroyed, it cannot be reconstructed.

After a print is developed on a non-porous surface, photograph it if possible, making sure to include a ruler in the picture so that the print may later be restored to accurate size. A disc containing these images may also be submitted as evidence. Lift the developed print with fingerprint tape. Whenever possible, make a duplicate lift.

Supply the following information on all lifts:

(1) The name (or initials) of the individual making the lift

(2) The date the lift was made

(3) A case number or other identifying number

(4) An indication of where the lift was obtained (description and diagram)

(5) Duplicate lift notation

Do not mark directly behind the latent-lift to minimize interference with AFIS entry.

Porous or absorbent surfaces, such as paper, cardboard and unfinished wood, ordinarily cannot be processed with powders, as skin oils soak in and are not left exposed to the powders. Evidence of this type should be submitted to the laboratory for chemical processing.

Various light source instrumentation is available in the TBI Crime Laboratory. The equipment has limited capabilities in field situations, and is best utilized in a controlled environment.

The forensic scientist assigned to each case determines the method of analyzing an item of evidence. Please note if any evidence has been processed prior to its submission to the Crime Laboratory.

For wet items, the best results will be obtained in the laboratory. Allow wet items to air-dry naturally. Do not dry with forced hot air (e.g., hair dryer). Do not attempt to powder process a wet item of evidence. Do not package a wet item of evidence. Do not package an open container that still contains liquid. Pour out the liquid and submit the container for processing. If needed, save the liquid in another container.

DO NOT process or attempt to lift prints in blood. Allow bloody items or prints to air-dry naturally and photograph, with a ruler, if possible. Do not dry with forced hot air (e.g., hair dryer).

Please note that there is no scientific method for determining the age of a latent print.

In latent print cases, provide both entire fingerprint and palm print impressions of the subjects involved. Whenever possible, finger and palm prints of the victim should also be submitted. This is especially important in cases involving numerous latent prints. When fingerprinting someone, collect complete

(fully rolled) and legible prints. Please note that prints suitable for classification purposes are not always of sufficient quality for latent print comparisons.

Evidence Submission

Latent Fingerprints, Palm Prints and Footprints

Cases will be prioritized when they are received into the latent print unit. Cases of a violent nature such as homicides, rapes and robberies will be processed first. Nonviolent cases, such as burglaries, thefts and vandalisms, will be worked in the order they are received into the laboratory, provided only comparison evidence is submitted, (i.e. latent lifts and/or known impressions). Cases of a nonviolent nature in which nonporous evidence (glass, plastic, metal, etc.) is submitted to the lab for latent print processing will be given a very low priority. It is recommended that investigators process nonporous evidence at the scene of nonviolent crimes using basic latent print supplies (brush, black powder, lift tape, and 3 x 5 cards) and submit the latent lifts as evidence.

Porous items (paper, cardboard, etc.) and evidence requiring advanced latent print processes (e.g. bloody evidence, tape, etc.) collected at nonviolent crime scenes should be submitted to the lab for processing and will be worked in the order received.

When requesting both latent print and controlled substances testing in a case, the evidence must be separated prior to submittal to the laboratory. If the controlled substance and packaging are not separated, the submitting officer must choose which analysis will be performed (either drug testing or latent processing).

Some of the factors affecting latent prints and their quality include the surface material containing the latent print(s), the amount of perspiration, oils, and foreign matter on fingerprint ridges, weather conditions, pressure, duration, and the handling of the item containing the latent fingerprint(s). Latent prints are very fragile and can easily be destroyed; therefore, extreme care should be used when handling any item suspected of containing latent prints. Handle evidence very carefully even when wearing gloves. All evidence submitted for latent prints should only be handled when wearing gloves.

Send all known fingerprints for latent comparison purposes *directly* to the Evidence Receiving Unit.

Submit the subject and victim's full name, race, sex, and date of birth. If inked impressions are not submitted with the evidence, the TBI fingerprint files will be searched.

When possible, collect a set of known inked impressions specifically for latent print examination.

Submitted known impressions are returned to the requesting officer.

Prior to packaging evidence related to latent prints, conduct a visual examination for obvious latent prints. If any are observed, package and secure the evidence in a suitable container that will prevent the impression from smudging or damage. Follow the Crime Laboratory's standard evidence submission procedures. **Check all packages for proper seals and sufficient labeling.**

Hand-carrying fragile evidence to the laboratory is the best way to prevent damage.

Remember not to package wet items. Air-dry them and then package them in paper bags or cardboard boxes.

Wear surgical (or smooth surface) gloves and handle evidence "lightly". Do not write on containers to be processed for latent prints. Place such items in a separate container and label carefully.

When submitting tape, package each strip or piece in separate containers to prevent the loss or cross-contamination of trace material, and to prevent pieces from adhering to one another.

It is important to distinguish packaging from evidence on the submittal form to eliminate unnecessary processing. This may be accomplished by marking all packaging (including interior packaging) or noting non-evidentiary items on the submittal form.

Automated Fingerprint Identification System

The Latent Print Unit provides local agencies with access to the state's Automated Fingerprint Identification System (AFIS). The AFIS computer stores images of most of the ten print fingerprint cards on file at the Tennessee Bureau of Investigation. The Latent Print Unit also has the capability to search a latent print through the national (IAFIS) database under certain circumstances.

The AFIS computer can search a latent fingerprint or palm print from a crime scene against fingerprint cards stored in the AFIS database. If the person who left a fingerprint at a crime scene has fingerprints stored in AFIS, the TBI may be able to identify the latent print and provide the name of a potential suspect. If a latent print is searched against the AFIS database with no identifications, additional searches will be conducted as new known impressions are entered into the database.

Please note that the TBI AFIS *cannot* search the joints, sides, or tips of fingers, or footprints.

In addition, do not assume that a crime was committed by someone who does not have a prior record simply because the AFIS does not identify the latent fingerprints submitted from a crime scene.

AFIS Evidence Submission

Submit latent fingerprints for AFIS searches with a completed evidence submission form.

Submit AFIS requests to the TBI Evidence Receiving Unit.

Any questions concerning the submission of AFIS latent print searches should be directed to the TBI Latent Print Unit.

All questions regarding "Ten Print Cards" should be directed to the TBI ISS Unit (615-744-4000).

Report Interpretation

A latent print report lists the evidence processed and the results of the examination.

An identifiable latent print result indicates that identification may be possible if known impressions are available for comparison.

Reports with latent print identifications indicate the subject's name, the finger or palm identified, and, when possible, the location of the print.

Occasionally, submitted and/or developed latent prints will remain on file for future comparisons. The status of the evidence will be included in the disposition of the lab report.

Some evidence cannot be stored at the laboratory; therefore, once the lab report has been received from the lab, evidence must be picked up by the submitting agency within thirty days.

MICROANALYSIS UNIT

- Do not package the victim's and suspect's clothing together.

- No attempts should be made to collect or remove shoe impression evidence from a crime scene without **photographing the print or track first**. This must be performed with a **measuring device, camera perfectly parallel over the shoe impression**, and with the impression filling the picture frame as much as possible.

- No attempts should be made to cast tire impression evidence at a crime scene without **photographing the track first**. This must be performed with a **measuring device and camera perfectly parallel over the tire impression**. **All** suspect tracks present at the crime scene must be photographed in their entirety.

- Fire debris evidence should be packaged in clean metal paint cans or mason type jars and filled only 1/2 to 3/4 full. Never package fire debris in plastic or paper bags.

- Gunshot Residue (GSR) – Hand Swabs – TBI recommends using the kits provided by laboratory and follow instructions provided. Kits from outside vendors will also be accepted and analyzed.

- Wet or bloody items of evidence associated with hit and run accidents should not be air-dried. Submit immediately to laboratory for analysis.

- Submit known paint and glass standards in sealed containers (i.e., druggist fold pieces of paper, envelopes with all edges taped, or film canisters).

- A request for fiber analysis can only be performed when fiber standards (i.e., carpet or upholstery) are also submitted with the subject's and/or victim's clothing.

MICROANALYSIS UNIT

The Microanalysis Unit deals with a wide variety of evidence. If a laboratory technique is not listed below, please contact the Microanalysis Unit with inquiries.

- Fire Debris Examination for petroleum products and alcohols
- Analysis for oils and greases
- Analysis for sugar in engine fuels
- Analysis of gunshot primer residue hand swab kits
- Analysis for gunshot primer residue on subject clothing and other items
- Shoe impression comparisons
- Tire impression comparisons
- Tire manufacturer and model determination from tire impressions
- Paint comparisons
- Vehicle make and model determination from paint evidence
- Glass comparisons
- Glass fracture analysis and order of breakage
- Fiber comparisons
- Indented writing determinations
- Speedometer analysis
- Physical comparisons such as fracture match analysis or comparisons of similar items
- Analysis for heavy metals such as arsenic, copper, thalium and lead
- Analysis for chemical sprays
- Unknown substance determination
- Tape comparisons
- Hair analysis
- Explosive analysis
- Composite imagery

FIRE DEBRIS EXAMINATIONS

Debris from fire scenes is submitted to the Crime Laboratory to determine the presence of an unconsumed ignitable liquid. This includes the products of refined oil, (gasoline, kerosene, diesel fuel, etc.), alcohol and other flammable/ combustible products.

Ignitable liquids that have not been consumed by fire, washed away by water, or evaporated by exposure, are most often found remaining in materials that have absorbed them easily and retained them well. These include carpeting, soft woods, fabrics, paper, soil and occasionally concrete.

Collection and Packaging of Evidence

Wear clean disposable gloves for the collection of each piece of evidence suspected to contain an accelerant. Change gloves between collection of each evidence sample.

Use clean tools for collection, cleaning and rinsing tools between each sample.

Store debris and samples in **clean paint cans and Mason type jars**. The cans should be filled no more than **1/2 to 3/4 full**. If a large clothing item is to be analyzed, cut the item into pieces and use several cans.

The can lids should be closed using a hammer. Stomping the lid to the can with your foot may not produce an airtight fit.

Liquid samples should be removed from large containers before submission to the laboratory. Place liquid samples in small glass or metal containers.

Unsuitable Containers (DO NOT USE):

- **Paper bags,**
- **Nylon or aluminized Mylar bags,**
- **Polyethylene bags, or**
- **Coffee cans with plastic lids.**

When alcohols are suspected, this must be indicated on the "Request for Examination" form as additional testing is required.

Laboratory Examination of Fire Debris

The primary role of the forensic scientist is the recovery and determination of any ignitable liquid residue in the samples submitted. A report will be generated identifying the accelerant with examples of possible products.

Terpenes are often identified in debris containing some types of wood. These chemicals are present in turpentine and occur naturally in some wood products; therefore, it is not possible for the forensic scientist to determine the origin of the **terpenes**. In addition, the chemical **toluene** can be recovered from most shoes with glued soles. A report will indicate the presence of this chemical with an explanation of the possible origin. A heavy petroleum product is sometimes recovered from some types of shoes and inks used for printing. The laboratory results will reflect this identification.

ANALYSIS FOR OILS AND GREASES

The analysis for oils and greases can become relevant in the investigation of sexual abuse and hit and run cases. Petroleum and vegetable based oils, greases and lubricants can be analyzed and compared to known samples.

In cases of suspected sexual abuse, the suspected oils and lubricants should be submitted with the victim's clothing. The clothing should be packaged in sealed brown paper bags. The oils and greases can be packaged in plastic bags and sealed metal paint cans. Care should be taken to assure that the known lubricant does not leak through the packaging and contaminate other evidence.

Clothing from the victim(s) of hit and run accidents should be packaged in brown paper bags. Known lubricant samples need to be taken from the undercarriage of the suspect vehicle with particular interest in areas beneath the vehicle showing possible disruption.

ANALYSIS FOR SUGAR IN ENGINE FUELS

In cases involving the possibility that sugar has been added to automobile engine fuels, a sample from the fuel tank must be submitted. It is important that the sample come from the bottom of the tank as sugar does not dissolve in petroleum products and the crystals will settle on the bottom.

The samples should be packaged in sealed Mason type jars or metal paint cans.

ANALYSIS OF GUNSHOT RESIDUE KIT – HAND SWABS

The analysis is used to determine the presence of antimony, barium and lead, which are the main elements of gunshot primer residue, from hands of individuals who may have fired, handled or was near a gun when it was fired.

Collection and Packaging of Evidence

Gunshot Residue Kits are provided by the Tennessee Bureau of Investigation Crime Laboratory free of charge. These kits have complete instructions on the proper collection technique. An information sheet is also provided within the kit, which should be filled out completely. When possible, submit a cartridge case from the scene, or use the space available on the information sheet to describe the ammunition manufacturer's identifying marks.

Do not attempt to make your own kits.

Do not allow the subject/victim to remove rings or wash his/her hands prior to swabbing. Blood and dirt does not affect the outcome of the analysis. Blood stained items must be labeled as a biological hazard.

The officer performing the swabbing of the suspected shooter's hands should wash his/her hands prior to using the kit, or wear gloves.

A partially collected kit can be analyzed, should only one hand be available to swab; however, a kit that does not contain a control swab will **not** be tested.

Gunshot Residue Kits from subjects **and** victims will be analyzed.

ANALYSIS OF GUNSHOT PRIMER RESIDUE ON OBJECTS

This analysis is designed to determine the presence of antimony, barium and lead on items that were near a firearm when it was fired. These objects can include, but are not limited to:

- Subject's clothing, including gloves;
- Vehicles (from drive-by shootings, etc.); or
- Windowpanes.

It is recommended that if a Gunshot Residue Kit is performed on the hands of a subject, the clothing should also be collected. Should the GSR kit be positive for gunshot primer residue, the subject's clothing will not be analyzed.

Collection and Packaging of Evidence

Package all items in sealed brown paper bags. The items must be handled with care, as gunshot residue is fragile evidence that can be easily lost or destroyed. Blood stained items must be labeled as a biological hazard.

FOOTWEAR AND TIRE IMPRESSIONS

At many crime scenes, tire and footwear impressions are often as difficult to locate as fingerprints. Proper protection at the crime scene will reduce the chances of additional impressions being made by emergency and investigating personnel. Crime scene officers should seek out this evidence at all crime scenes.

- When obvious footwear and tire impressions are located, check the personnel and vehicles present, as often these impressions can be eliminated. Photograph or print all shoes and tires that are eliminated to keep as a record of this elimination.
- Entrance and exit areas are good places to check for footwear and tire impressions. Sometimes, doors are kicked and items inadvertently stepped on. Consider such possibilities during crime scene processing.
- Check flooring by darkening the room and viewing the area with a flashlight held close to parallel with the floor (oblique lighting).

SHOE IMPRESSION COMPARISONS

Shoe impression evidence at a crime scene can be present in the following forms:

- Shoe impression(s) in mud, dirt or snow,
- Shoe impression(s) in blood or other residue,
- Shoe impression(s) on flooring (latent or in dust), or
- She impression(s) on removable objects.

Shoe impressions recovered from a crime scene or shoe impressions on an object can be compared to known shoes from a subject.

Collection and Packaging of Evidence

No attempts should be made to collect or remove shoe impression evidence from a crime scene without **photographing the print or track first.** This must be performed with a **measuring device, camera perfectly parallel** over the shoe impression, and with the impression filling the picture frame as much as possible.

For shoe impression(s) in mud, dirt or snow, a **dental stone cast** must be obtained. When the cast is hardened, remove cast, but do not attempt to clean the cast. Air-dry the cast for 24 to 48 hours, and then package the cast in a **brown paper bag or a box.** Casts should never be packaged in plastic bags as the casts may mold and consequently, degrade. The casts are fragile and can break. Care should be taken to package this evidence carefully prior to transporting to the crime laboratory.

In cases where shoe impressions are in blood or dirt on objects such as doors and flooring; these items should be **collected as is** and submitted to the laboratory for further enhancement, analysis and comparison. Do not package bloody shoe impressions that are not completely dried. Protect the print in such a way that the impression is not disturbed during transport (such as a **box taped over the print or brown paper propped up with empty film canisters**).

Shoe impressions in dust should be collected with an electrostatic lifter or gelatin lifter (remember to photograph first). These are available at the Nashville, Knoxville and Memphis Crime Laboratories. Electrostatic lifts should be taped into **shallow boxes** with the shoe impression side up and hand delivered to the crime laboratory. Gelatin lifters (available through law enforcement catalogs) are temperature sensitive and should be kept out of extreme heat and cold. The gelatin lifts can be packaged in **sealed envelopes or brown paper bags**.

Shoe impressions that are developed using latent print powder can be lifted with wide fingerprint type tape or palm print lifters and secured to a clear document page protector. The lifts can then be packaged in **sealed envelopes or brown paper bags**. Once again, remember to photograph prior to attempting the lift.

Papers on a floor at a crime scene should always be collected for shoe impression analysis, even if the print is not visible with the naked eye. The collected papers can be tested at the laboratory for the presence of shoe prints. These papers should **be taped to the bottom of a box** as they were found at the scene (if two overlap, they should be collected in this orientation).

Subject(s) shoes should be packaged in **sealed brown paper bags**. Blood stained evidence must be labeled as a biological hazard.

TIRE IMPRESSION COMPARISONS & TIRE MANUFACTURER AND MAKE DETERMINATION

Tire impressions recovered from a crime scene or tire impressions on a object such as victim's clothing can be compared to known tires from a subject vehicle.

If a subject vehicle is not available and there is sufficient detail in the track at the scene, a tire manufacturer and tire brand name can be provided from a tire tread computer database. If the tire is used only on new vehicles, manufacturer vehicle make and model may be provided. Further information about the tires can be obtained through contact with tire manufacturers.

Collection and Packaging of Evidence

No attempt should be made to cast tire impression evidence at a crime scene without **photographing the track first.** This must be performed with a **measuring device** and the **camera perfectly parallel** over the tire impression. ***All*** suspect tracks present at the crime scene must be photographed in their entirety. If a long stretch of track is available, at least 10 ft. of the track should be photographed to ensure documentation of the full circumference of the tire.

For tire impression(s) in mud, dirt or snow, **dental stone casts** must be obtained of the entire track. When the casts harden, remove it, but do not attempt to clean the cast(s). Air-dry the cast(s) for 24 to 48 hours, and then package the cast(s) in **brown paper bags or boxes**. The cast(s) are fragile and can break, therefore, care should be taken to package this evidence carefully prior to transporting to the crime laboratory.

In situations where the tire tracks are on objects such as victim clothing, the item(s) should be collected as is and submitted to the crime laboratory. Do not package blood stained clothing until completely dry. Remember-for hit and run accidents where paint/glass analysis is requested-do not air-dry the clothing and bring them to the laboratory as soon as possible. Blood stained clothing must be labeled as a biological hazard. Protect the track in such a way that the impression does not wipe away during transport. This can be accomplished by placing the item, track side up, in a box and hand deliver to the crime laboratory.

If a subject vehicle is recovered, test impressions of *all the tires* must also be submitted with the tire impressions and photographs from the scene. The subject vehicle can be submitted to the crime laboratory if this technique is unfamiliar. Contact the Evidence Receiving Unit prior to submittal.

PAINT

The analysis and comparison of paint evidence can be requested in cases involving:

- Subject vehicle impacting victim vehicle
- Subject vehicle impacting pedestrian
- Subject vehicle impacting stationary object
- Tool impacting stationary object
- Graffiti

Laboratory examination can be performed on both subject and victim paint samples and can be compared based on color, texture, type, layering sequence, pigment and binder compositions.

In cases of hit and run accidents, paint recovered from victim's clothing and from the scene can be analyzed and this data can be entered into a database that may provide possible vehicle manufacturer's makes and models.

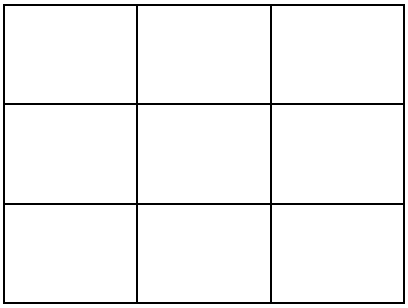
Collection and Packaging of Evidence

Submit all painted evidence recovered from the scene.

In cases where the object is too large to submit, obtain a known paint sample by cutting down through all the paint layers to the object base. Do not merely scrape the surface. Obtain samples from the damaged areas of the vehicle(s). If the damage is to several panels of the vehicle (i.e. hood, bumper and quarter panel), a sample must be taken from each, as the paint may be different on each panel. If the damage is on a quarter panel that is divided by molding or pin striping, a sample must be taken above and below the divider.

Place the paint sample in a **piece of paper folded in a druggist fold** (see diagram), tape and **then seal within an envelope. Do not put paint sample directly in an envelope** as the paint will stick to the adhesive or fall through the corners.

Druggist Fold
Fold paper first. Place sample in middle square. Refold and tape.



Liquid paint samples should be submitted in their original containers. If that is not possible, **pour paint into vapor-tight cans or vials.**

Wet and/or blood stained clothing from victims of a Hit and Run accident must never be hung up to air-dry; transport to the crime laboratory immediately for analysis. Blood stained clothing must be labeled as a biological hazard.

Burglary tools, such as screwdrivers and crowbars, may retain paint traces. Whenever possible, submit the entire tool in sealed brown paper bags or boxes. The area with the paint transfer should be protected by placing a piece of paper over the paint and securing all sides with tape.

GLASS ANALYSIS AND COMPARISONS

Glass is a rigid, durable material with variation in composition and application which renders it useful as associative evidence. The Tennessee Bureau of Investigation Crime Laboratory provides two types of glass analysis: Glass Fracture Analysis/Order of Breakage and Glass Comparisons.

Glass Fracture Analysis/Order of Breakage

Glass fracture patterns are unique; fractures caused by impact, heat, high velocity projectiles and glasscutters may each be distinguished. Laboratory examination of recovered shards of glass may reveal the direction and sequence of breaking.

Collection and Packaging of Evidence

Glass found remaining in a broken window should be secured in place with tape to facilitate reconstruction. (Tape should not be used if a latent print examination is also requested.) The pane should be **marked as to inside, outside, top and bottom**. Place the pane in **cardboard and/or brown paper** and seal to prevent further breakage before transporting to the Crime Laboratory. If a gunshot residue test is also being requested, avoid handling the glass and protect the pane against abrasion.

Submit all available glass from the inside and outside areas near the window so that the pieces can be fitted together to determine the point of impact. These pieces should be packaged separately from the pane and labeled as to where they were recovered.

Evidence boxes and paint cans can be used as containers and will guard against possible injury to submitting officer and laboratory personnel.

Wrap each piece of glass securely and package tightly; **avoid the use of paper envelopes** to contain loose glass.

Glass Comparisons

When glass is broken, glass particles rebound and shower more than 10 ft. toward the direction of the force. Therefore, glass can be found in the hair and clothing of any individual in the vicinity. Glass particles can also be embedded in the objects used to break the glass object. Glass from the subject's clothing and body can be compared to a glass standard from the crime scene.

Collection and Packaging of Evidence

Submit all glass available from the broken object. If multiple glass items were broken at the scene, package each separately in sealed **boxes or paint cans. Avoid the use of envelopes** for small pieces of glass.

Check for glass fragments on the subject's hair and in wounds. Collect the subject's clothing, shoes and any instrument he/she may have used to break the glass. Package the items in **sealed brown paper bags.** Always package subject's clothing and shoes separately.

FIBERS

Individual fibers as well as larger textile constructions such as fabric, carpet and cordage may be characterized and compared to corresponding materials recovered from a suspect or his/her environment. Laboratory analysis of fibrous trace evidence is based upon microscopic examination and comparison, in conjunction with instrumental methods.

Fiber evidence can be found at the scene of various types of crimes, such as murder, rape, burglary and hit-and-run. A laboratory analysis can associate a subject to a victim, a subject to a location or a victim to a location.

Some types of fiber evidence that may be found at a crime scene or associated with an individual are:

Clothing
Carpets
Bedding
Fibers in hair, under fingernails, or on the body
Wigs
Masks
Gloves
Fabric fragments from crime scene point of entry
Buttons with thread and/or fabric attached
Ropes and twine
Tape
Fabric impressions
Fibers on weapons
Fibers under tape
Fibers on or under vehicles (in hit-and-run cases)

Collect and package fiber evidence as soon as possible to prevent loss or contamination of the evidence.

Take precautions to prevent contamination of fiber evidence by following these guidelines:

(1) Do not interview the victim(s) and suspect(s) in the same areas.
(2) Keep the crime scene clear of unnecessary personnel.
(3) The suspect should never be brought back to the crime scene prior to recovering fiber evidence.
(4) Clothing items from the victim and the suspect should not be allowed to rest on the same surface before packaging.
(5) Each item of evidence should be packaged separately as soon as possible.

Collection and Packaging of Evidence

Subject *and* victim clothing should be collected and packaged separately in **sealed brown paper bags.** Blood stained clothing must be labeled as a biological hazard.

Standard or known carpet and fabric samples must be collected from all carpeted and upholstered areas of the crime scene that the subject may have come in contact with. The carpet standards can be packaged in **sealed brown paper bags, film canisters, petri dishes or druggist fold (see "paint" for diagram of druggist fold)**.

Vacuumings from a crime scene or vehicle should be packaged in **sealed brown paper bags** with **all seams** taped to guard against loss of debris.

INDENTED IMPRESSIONS

Indented impressions are created when the writing, drawing, typing or printing upon a top sheet of paper imparts an indentation on sheet(s) of paper immediately below the page bearing the intended image.

Collection and Packaging of Evidence

Do not attempt to enhance indented impressions in the field.

Submit pads of paper, notebooks or book covers in **sealed brown paper bags**.

SPEEDOMETERS

When two vehicles collide, or a vehicle strikes another inanimate object at a high rate of speed, an approximate speed at the time of impact may be determined if the speedometer needle hits the gauge face.

Collection and Packaging of Evidence

Package the speedometer in a **sealed brown paper bag or box**.

PHYSICAL MATCHES

The physical matching of one piece of evidence to another can establish that two items were once joined as one. If an article is randomly separated into two or more pieces during the commission of a crime, a jigsaw fit of the edges can show conclusively that the pieces were once joined. If a jigsaw fit is not possible, corresponding features on the pieces that show a pattern can be used to show that the pieces were once joined.

Physical matches are conclusive when performed on rigid items that are broken, such as glass, paint, wood, concrete, metal and some plastics. They may be less conclusive when performed on material that changes shape significantly under the stress needed to sever it, such as cloth, tape, threads, or soft plastic films,

Automobile parts frequently remain at the scene of car accidents. They may be identified as to type of material, sometimes as to which part of a car, and occasionally as to make and year of the car. Physical matches are common and provide proof that a broken part found at the crime scene came from a corresponding broken part from the suspect's vehicle.

Most items can be packaged in sealed brown paper bags.

Sharp items such as glass and knives should be packaged in sealed paint cans or boxes. Blood stained items must be labeled as a biological hazard.

ANALYSIS FOR HEAVY METALS

The Microanalysis Unit can analyze crime related evidence for heavy metals such as copper, lead, cadmium and arsenic. This analysis is usually performed in conjunction with the Toxicology Unit which will analyze the same evidence for non-metallic poisons and drugs.

The following will be accepted for this type of analysis:

- Blood
- Urine
- Organs from autopsies
- Suspected illegal alcoholic beverages (moonshine)
- Foot items

For other items, prior to submittal, please contact the Microanalysis Unit.

Blood and urine can be submitted in standard hospital collection tubes and containers. The TBI issued Blood Alcohol Collection Kit can be used for the blood samples.

Organs should be double bagged with a security seal and labeled as a "Biohazard". These should also be frozen prior to submittal.

Other items should be placed in air type packaging such as glass or rigid plastic containers.

ANALYSIS FOR CHEMICAL SPRAYS

This analysis is designed to identify any of the three major components of commercial pepper sprays, which includes:

- Alpha-chloroacetophenone (CN)
- Orthochlorobenzalmalononitrile (CS)
- Oleoresin Capsicum or Capsaicin (OC)

Please package all items that may have come in contact with the above listed sprays in air tight containers such as clean paint cans or sealed ziplock type bags (double bagging is recommended). These chemicals are severe irritants.

The manufactured chemical spray container should also be submitted with the evidence if possible. However, if the container is not available, the analysis for the spray is still possible. This information must be placed on the outer packaging.

TAPE COMPARISON

A torn or cut end of tape recovered from a crime scene may be found to physically match the end of a partial roll recovered from the subject(s). In the absence of a physical match, questioned and known tapes may be associated on the basis of common physical construction, color and fiber composition.

Collection and Packaging of Evidence

Tape recovered from a crime scene or victim should be recovered and placed as a unit onto a **clear document page protector** or heavyweight polyethylene bag. In the laboratory, the tape can be removed and examined for fingerprints and trace evidence prior to tape comparisons. The roll used for comparison to the tape from the crime scene can be packaged in a separate **sealed brown paper bag.**

HAIR ANALYSIS AND COMPARISONS

The laboratory analysis of hair evidence cannot be performed at the Tennessee Bureau of Investigation Crime Laboratory. It is suggested that these samples be sent by the investigating agency directly to the Federal Bureau of Investigation Crime Laboratory at the following address:

Federal Bureau of Investigation Laboratory
2501 Investigation Parkway
Quantico, VA 22135

The FBI policy dictates that hair analysis and comparisons will not be performed if DNA analysis produced a positive association.

30 pulled head and pubic hairs from subject *and* victim must be provided to the FBI Crime Laboratory as standards for comparison. These can be packaged in **envelopes, sealed brown paper bags, film canisters, petri dishes or druggist fold (see "paint" for diagram of druggist fold).**

The Tennessee Bureau of Investigation Crime Laboratory will send hair to the FBI under the following conditions:

- The hair samples were recovered by TBI's Violent Crime Response Teams.
- The hair samples were recovered from a vehicle submitted to the Crime Laboratory for analysis.
- The case is being investigated by the Tennessee Bureau of Investigation.

EXPLOSIVE ANALYSIS

The Microanalysis Unit will analyze suspect material for the presence of low and high explosives.

This evidence will only be accepted into the laboratory under the following conditions:

(1) Should suspected explosive material be recovered, do not attempt to deactivate and package the evidence. Contact the **Tennessee State Bomb and Arson Section at 615-741-3030.** They will take the appropriate action to deem the material safe and properly package it for transport.

(2) The **Tennessee State Bomb and Arson Section** will also be responsible for the submittal of the explosive evidence to the Tennessee Bureau of Investigation Crime Laboratory. All Request for Examination forms will be filled out by the Tennessee Bomb and Arson Section having their

unique agency case number. They will then disseminate copies of official laboratory reports to all collaborating agencies.

(3) All explosive evidence will be hand delivered to the TBI Laboratory by the Tennessee State Bomb and Arson Section.

COMPOSITE IMAGERY

The Tennessee Bureau of Investigation Crime Laboratory provides the following Forensic Art Services:

- Composite Drawing – Hand drawn images of persons using interviewing techniques of witnesses and victims
- Postmortem Drawing – Hand drawn images of deceased persons for identification
- Reconstruction Drawing – Hand drawn images from skeletal remains for identification
- Image Modification – Aging of adult persons, changes in image such as the addition, subtraction and alteration of hair, addition of glasses, etc.
- Drawing of subjects from video tapes

Requirements

Composite Drawing – The ability of a witness/victim to recall the face of a person can depend on the following:

- External conditions – lighting, distance, weather and viewpoint
- Insufficient attention span – too little time viewing the person, caught by surprise and too many subjects
- Physical limitations – poor eye sight, intoxicated, pain
- Mental limitations – inability to judge, communicate or express visual observations
- Psychological Limitations – emotion, trauma and prejudice

These factors should be evaluated prior to contacting the artist.

The artist will travel to your location; however, a quiet non-distracting location free of photographs and telephones is required.

Postmortem Drawing – The artist will need a copy of all crime scene and autopsy reports. In addition, clothing description and sizes (if available) are necessary for a more accurate drawing.

Reconstruction Drawing – The remains must be sent to an anthropology department where an age, race and sex determination can be performed. In

addition, it is requested that the anthropologist clean the skull. **Skulls will not be accepted for reconstruction** drawing if they have not been analyzed and cleaned first by an anthropologist. The artist will need the skull, any photographs of the crime scene, the autopsy and anthropology reports and, if available, description and sizes of clothing. Cleaned and analyzed skulls can be mailed or delivered directly to the crime laboratory. Skulls are fragile and care should be used when packaging for shipment.

All original drawings are maintained as evidence at the crime laboratory. Computer scanned copies of the drawing may be provided to the requesting officer. To schedule a composite drawing, please contact Sandi Poltorak at 615-744-4404.

TOXICOLOGY UNIT

- If a person has been poisoned by food or medicine, any potential poisons found at the scene (i.e., boxes of rat poisons, etc.) should be collected and preserved by refrigeration or other appropriate means.

- Obtain specimens **as soon as possible** after the offense occurs.

- In the event of a large time lapse between the offense and evidence collection (for example: "date rape/drug facilitated rape"), it is important to collect both blood and urine samples, if possible.

- Try to collect 20 milliliters of blood and at least 20 milliliters of urine.

- DNA/Sexual Assault Evidence Collection Kits do not provide sufficient sample for full toxicology testing. Please submit additional blood and/or urine samples for toxicology testing.

- Observe the collection of **all** specimens.

- **All containers should be labeled** with subject's name, time, date, etc. as soon as specimen is collected.

- Specimen containers should be **packaged** to prevent leakage and possible cross contamination.

- Fill out alcohol/toxicology request form **clearly** and **completely**. Be sure the subject's name is listed correctly.

- **List all suspected drugs** or other substances that may be present.

- Submit specimens to the crime laboratory **as soon as possible** to avoid deterioration of any suspected drugs that may be in the sample.

- Submit all blood using the TBI Blood Alcohol/Toxicology Evidence Collection Kit to the crime laboratory serving your area.

- Blood samples need to be protected from heat. Storage in a refrigerator is recommended.

Toxicology Unit

1. Capabilities and Services

- Analyses of alcohol in Biological Samples
- Analyses of drug substances in Biological Samples
- Analysis of poisons in Biological Samples
- Analysis of non-taxed alcohol

2. Toxicology Cases

The Toxicology Unit will not routinely screen blood for drugs in D.U.I. cases when the blood has an alcohol concentration at or above the statutory minimum to show impairment (0.08 grams of alcohol per 100 milliliters of whole blood).

The Toxicology Unit does not conduct employee screening for controlled substances or participate in drug monitoring programs. Blood or urine samples related to such programs will not be accepted for analysis.

3. Poison Cases

- If a poison has been administered to a person, the Toxicology Unit will attempt to confirm the presence of that poison. The number of potential poisons is large, and it is crucial for the investigating officers to provide the laboratory with information concerning the specific poison suspected and the circumstances surrounding the suspected poisoning.

- If a person has been poisoned by food or medicine, collect any available leftovers and preserve them by refrigeration or other appropriate means (i.e., ice chest).

- Carefully evaluate the circumstances surrounding the suspected poisoning. The Toxicology Unit does not analyze for bacterial toxins which occur when food spoils. County Health Departments, the Tennessee Department of Health Laboratories, and the Tennessee Department of Agriculture Laboratories analyze for bacterial toxins.

- Be certain that evidence submitted for analysis has some reasonable basis for submission based on investigation and crime scene processing. Domestic disputes and complaints of bad-tasting food or beverages do not warrant the submission of items to the laboratory.

4. Evidence Submission Guidelines

The Toxicology Unit accepts evidence if a criminal arrest has been made or is anticipated. Evidence from concerned parents, schools, organizations, private citizens, and evidence that has no value for criminal prosecution will not be accepted.

- All criminal evidence types normally mailed, including TBI evidence collection kits such as Blood Alcohol/Toxicology, DNA, Sexual Assault Evidence Collection, Buccal Swab Collection or Gunshot Residue Kits will only be accepted if properly packaged and from a commercial carrier that provides transfer documentation such as the U.S. Postal Service Registered and Express Mail, UPS and Federal Express.

- Personal delivery represents the safest method of submitting evidence to the laboratory.

- You should follow the instructions listed on the back of the Alcohol/Toxicology Request Form.

- Obtain specimen(s) **as soon as possible** after the offense occurs.

- Try to collect 20 milliliters of blood and at least 20 milliliters of urine.

- Observe the collection of **all** specimens.

- **All containers should be labeled** with subject's name, time, date, etc. as soon as specimen is collected.

- Specimen containers should be packaged to prevent leakage and possible cross contamination.

- Fill out alcohol/toxicology request form **clearly** and **completely**. Be sure the subject's name is listed correctly.

- **List all suspected drugs** or other substances that may be present.

- Submit specimens to the crime laboratory **as soon as possible** to avoid deterioration of any suspected drugs that may be in the sample.

- Submit all blood using the TBI Blood Alcohol/Toxicology Evidence Collection Kit to the laboratory serving your area.

- Be sure the person taking the blood sample does not leave the needle or other unnecessary items in the kit.

- Use the protective packaging included with the kit for submission to the Toxicology Unit.

- Blood samples need to be protected from heat, and storage in a refrigerator is recommended.

- After the analysis is completed, biological samples are retained in the laboratory for a period of at least sixty days and then destroyed. Samples can be retained with court order.

5. Report Interpretation

The Toxicology Unit reports analysis results as follows:

- Blood-alcohol concentrations are reported in gram percent (grams of alcohol per 100 ml of sample).

- Alcohol concentration for liquor submission is reported as a percent by volume. To convert the concentration to "proof", double the percent concentration (e.g., 80 percent by volume equals 160 proof).

- Drug concentrations are reported in ug/ml (micrograms per milliliter of specimen) or in ng/ml (nanograms per milliliter of specimen).

- Drugs are reported as positive when quantitative results cannot be obtained due to poor sample condition, insufficient sample for quantitative results, chromatographic conditions, etc.